UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/668,869	09/22/2003	Richard D. Breault	C-2789	3166

7590 10/02/2007

M. P. Williams
210 Main Street
Manchester, CT 06040

EXAMINER	
LEWIS, BEN	

ART UNIT	PAPER NUMBER
1745	

MAIL DATE	DELIVERY MODE
10/02/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/668,869	BREAULT ET AL.	
	Examiner	Art Unit	
	Ben Lewis	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3 and 16-20* is/are pending in the application.

4a) Of the above claim(s) *6,7,9-14 and 20* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3 and 16-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election with traverse of Species III, Figs. 7 and 8 readable on claims 1,3, 16 and 17-20, in Paper filed July 17th 2007 is acknowledged. The traversal is on the ground(s) that all species are covered by claims 1 and 20 which are allowable. This is not found persuasive because species require a different field of search (e.g., searching different classes/subclasses or electronic resources, or employing different search queries); and/or the prior art applicable to one species would not likely be applicable to another species; and/or the species are likely to raise different non-prior art issues under 35 U.S.C. 101 and/or 35 U.S.C. 112, first paragraph. The requirement is still deemed proper and is therefore made FINAL. Therefore, claims 6-7, 9-14 and 21 are withdrawn from consideration.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 18-19 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which

was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Applicant has not disclosed how to make or use the invention. It would be undue experimentation for one of ordinary skill in the art to practice the invention. There is no teaching of how the water removal, exhaust and transfer percentages as claimed by Applicant are arrived at.

Furthermore, it is not clear how one of ordinary skill in the art would be able to practice the instant invention since it lacks steps or working examples needed to arrive at or maintain the water removal, exhaust and transfer percentages as claimed by Applicant.

Factors to be considered in determining whether the claimed invention would require undue experimentation are given in MPEP 2164.01 (a). In re Wands, 858 F. 2d 731; 8 USPQ 2d 1400, 1404 (Fed. Cir. 1988). Only the relevant factors will be addressed for determining undue experimentation of the presently claimed invention. The relevant factors are (A) Breadth of the claims; (B) The amount of direction provided by the inventor, (C) The existence of working examples, and (D) The quantity of experimentation needed to make or use the invention based on the content of the disclosure.

Factor (A) Breadth of the claims:

No guidance is given in the specification as to how to arrive at or maintain the water removal, exhaust and transfer percentages as claimed by Applicant.

The specification is silent as to how the fuel cell system of Applicant is operated in order to arrive at or maintain the water removal, exhaust and transfer percentages as claimed by Applicant. It would be undue experimentation to one of ordinary skill in the art to determine the operation parameters in order to arrive at or maintain the water removal, exhaust and transfer percentages as claimed by Applicant.

Factor (B) The amount of direction provided by the inventor.

Applicant only gives numerous examples specific embodiments where the water removal, exhaust and transfer percentages are already established but is absent of any teaching as to how these values are determined or arrived at.

Factor (C) The existence of working examples:

This factor has been addressed by factor (B) above.

Factor (D) The quantity of experimentation needed to make or use the invention based on the content of the disclosure.

This factor has been addressed by factor (A) above.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1,3,16-18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koch et al (U.S. Pub No. 2003/014816A1) and further in view of Cisar et al. (U.S. Pub. No. 2003/0232234 A1).

With respect to claims 1 and 20, Koch et al disclose efficient fuel cell water transport plates wherein a fuel cell includes an anode, a cathode, and an electrolyte separating the two. Fuel reactant gas, typically a hydrogen rich stream, enters a support plate adjacent the anode (anode plate). Oxidant reactant gas, typically air, enters a support plate adjacent the cathode (cathode plate) (Paragraph 002). Due to their critical role in water management, the anode plates and cathode plates are often called "water transport plates" (WTP's). During PEM fuel cell operation the WTP's supply water locally to maintain humidification of the PEM, remove product water formed at the cathode, and supply water to the fuel cell to replenish water that has been lost by evaporation. Furthermore, the water transport plates remove by-product heat via a circulating coolant water stream (coolant water); conduct electricity from cell to cell in stacks of cells of a fuel cell power plant; provide a gas separator between adjacent cells; and provide passages for conducting the reactants through the cells (Paragraph 0005).

Koch et al. also teach that, FIG. 2 is taken from U.S. Pat. No. 5,840,414, and provides background information indicating the importance of various properties of water transport plates. Briefly, the fuel cell stack as shown in FIG. 2 includes the

polymer electrolyte membrane **20**, the porous cathode catalyst **22** and the porous anode catalyst **24** on the two sides of the membrane **20**. Hydrogen gas is supplied through the channels **26** of the upper separator plate **28**, and oxygen gas is supplied to the channels **30** of the lower separator plate **32**, with the channels **30** running perpendicular to the channels **26**. The hydrogen and oxygen combine, producing water and electricity. Coolant water flows through channel **36**. Additional membranes and separator plates are included in the stack, and the electrochemical reaction is taking place concurrently at various levels in the stack (Paragraph 0041).

Regarding the plates being porous and having water flow channels, Koch et al teach that typically, plates according to the present invention have a median pore size of 0.4 to 5.0 μm, with at least 50% pores by volume below 3.0 .μmM in size. Typically, the plate is stiff and provided with continuous flow channels on one or both faces of the plate (Paragraph 0064).

Koch et al also teach that referring more particularly to the drawings, FIG. 1 is a schematic showing of a fuel cell system. The system of FIG. 1 includes a source of hydrogen gas **12**, a source of oxygen **14**, which could be atmospheric air, and a fuel cell stack **16** which includes polymer electrolyte membranes (PEM) and separators, or water transport plates, as discussed below. The hydrogen and oxygen are combined, producing water as indicated by reference number **18**, and electricity as indicated at reference numeral 20 (Paragraph 0040).

Koch et al. does not specifically teach water transfer means disposed in each of said fuel cells for transferring water only internally within said stack from said cathode

water transport plate to said anode transport plates. However, Cisar et al. disclose an electrochemical cell and bipolar assembly for an electrochemical cell wherein, the bipolar assembly of the present invention comprises a gas barrier and an array of electronically conducting and protruding posts engaged with the gas barrier (Paragraph 0041). Optionally, the gas barrier may provide the ability to transfer water between the cathode of one cell and the anode of an adjacent cell while maintaining isolation of the anode and cathode gases. The gas barrier that transfers water can be made from a water permeable material or a composite that includes a water permeable material. Suitable water permeable materials include, but are not limited to, silica, hydrophilic polymers, and cellulose (Paragraph 0045). Therefore it would have been obvious to one of ordinary skill in the art to incorporate the water transfer means of Cisar et al. in to the fuel cell of Koch et al because Cisar et al teach that accordingly, water produced at the cathode, and normally rejected in the exhaust, passes through the barrier where it humidifies the fuel being consumed. This is advantageous because it promotes the full humidification of the PEM membrane, which minimizes its resistance to proton flow (Paragraph 0016).

With respect to claim 3, Koch et al. teach that, FIG. 2 is taken from U.S. Pat. No. 5,840,414, and provides background information indicating the importance of various properties of water transport plates. Briefly, the fuel cell stack as shown in FIG. 2 includes the polymer electrolyte membrane **20**, the porous cathode catalyst **22** and the porous anode catalyst **24** on the two sides of the membrane **20**. Hydrogen gas is

supplied through the channels **26** of the upper separator plate **28**, and oxygen gas is supplied to the channels **30** of the lower separator plate **32**, with the channels **30** running perpendicular to the channels **26**. The hydrogen and oxygen combine, producing water and electricity. Coolant water flows through channel **36** "manifold". Additional membranes and separator plates are included in the stack, and the electrochemical reaction is taking place concurrently at various levels in the stack (Paragraph 0041).

With respect to claim 16, Cisar et al. teach that optionally, the gas barrier may provide the ability to transfer water between the cathode of one cell and the anode of an adjacent cell while maintaining isolation of the anode and cathode gases. The gas barrier that transfers water can be made from a water permeable material or a composite that includes a water permeable material. Suitable water permeable materials include, but are not limited to, silica, hydrophilic polymers, and cellulose (Paragraph 0045). Cisar et al. also teach that the barrier may be solid, or porous, with the pores "holes" filled with a material that promotes the transfer of water from the cathode to the anode (Paragraph 0045).

With respect to claim 17, Cisar et al. teach that FIG. 1 is a cross sectional view of a bipolar assembly suitable for low-pressure operation in an electrochemical stack. The

gas barrier 14, which may be electronically conducting or non-conducting, separates the reactant fluids flowing across the face of the anode electrode 11 and the cathode electrode 12. A plurality of posts 15 is disposed across the gas barrier 14, each post being approximately perpendicular to the gas barrier. One end of each post contacts the current collector 13 on the anode electrode 11 and the other end of each post contacts the current collector 13 on the cathode electrode 12. The posts and the gas barrier form the "post-type" flow fields for the reactant fluids. One embodiment, as illustrated in FIG. 1, shows the posts 15 inserted through holes in the gas barrier 14, each post being sealed 16 into the hole in the gas barrier through which the post passes, thereby preventing reactant fluids from passing from one side of the gas barrier to the other (Paragraph 0051).

With respect to claim 18, a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). Since the shape of the bottom wall portion of the battery can of Probst et al. is the same as that of Applicant then the bottom wall of Probost et al. is inherently capable of absorbing compression. Since the fuel cell of Koch et al as modified by Cisar et al. has all the structural elements of Applicants' claimed apparatus then the fuel cell system of Koch et al. as modified by Cisar et al. is inherently capable of removing

and transferring water generated at the cathodes in the same manner as claimed by Applicants.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ben Lewis whose telephone number is 571-272-6481. The examiner can normally be reached on 8:30am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Ben Lewis

Patent Examiner
Art Unit 1745

PATRICK JOSEPH RYAN
SUPERVISORY PATENT EXAMINER